XII. ALDER SWAMP WOODS - ALNETALIA GLUTINOSAE

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Alder swamp woods are edaphic communities. Their soil is covered by oxygen-poor slack water in a great part of the vegetation period, mainly in spring and at the beginning of summer. As a consequence of the water table fluctuation, gleying and iron fall-out is frequent in the soil. In the middle of the summer the logged water shrinks, and as a consequence of the ventilation of the upper soil layer ammonia is oxidized to nitrate which favours to the appearance of weed communities.

The canopy layer consists of high trees, *Alnus glutinosa* in swamp areas having extensive buttress roots – so called "foots" – from which more trunks can grow clonally. The shrub layer is poor but the dense herb layer can grow on two substrates: on the widened foot of the trunks rising from water and on the soil among them. On the former, more stable island-like places mainly epiphyte, cortical species live while in the latter habitat several aspects (aquatic palnts, sedge vegetation, ephemeral floodplain weeds) can alternate depending on the water cover (Borhidi 2003).

XII.1 *Fraxino pannonicae–Alnetum* (Soó & Járai-Komlódi 1958)

Syn: *Thelypteridi-Alnetum* 1940, *Fraxineto oxycarpae-Alnetum hungaricum* Soó & Komlódi in Soó 1957 (Borhidi 2003).

The community was described by Klika first in 1940 which was modified by Soó and Komlódi in 1957, then by Soó and Járai-Komlódi in 1958 (Borhidi 2003).

In Hungary, among others Kevey has investigated the coenological characteristics of riverine woodlands (Kevey 1993, 1999 a, 1999 c), riverine ash-alder woodlands and alder swamp (Kevey 1997, 1999 b) forests.

Habitat conditions

This community has a special position, occurring on the southern distribution border of alder swamp woods in the subcontinental-submediterranean middle part of the Great Hungarian Plain. Its soil can dry out frequently therefore it does not contain much turf. In summer, the springs originated from the ground water of sand dunes give the continuous water supply. The stands of alder-ash woods formed

mainly on the alluvium of river beds. On the basis of the water supply, proportion of character species and level of disturbance, different alder-ash wood types can be distinguished: 1. watered, 2. sedgy, 3. transient types towards willow galleries or ash-alder woodlands (slow drying out, no weed stands, willow gallery elements appear), 4. dried type (tall herb species are frequent) (Borhidi 2003).

Hungarian coenologists reported *Alnus glutinosa* dominated relevés of this community which cannot be classified either into gallery forests or to *Carici elongatae-Alnetum*. These stands are flooded only periodically and the length of the period is very variable (1-8 months). This period is longer than that in gallery woods (1-4 months) and shorter than the 8-12 months period in *Carici elongatae-Alnetum* stands. Range of the habitat conditions of this association is quite wide and its types can be very different in physiognomy, species composition and ecological requirements (Nagy J. ex verb.) Therefore further examinations are needed to characterize this community.

Characterization of stands along River Tisza and its tributaries

Alltogether 71 historic and recent relevés were found from the region of rivers Tisza and Kraszna made in the period between 1958 and 2001. Evaluation of the data resulted that the species composition of the community in the Tisza basin is similar to that of the literature description of the alliance but stands without trees of widened foot are frequent. In the canopy layer *Alnus glutinosa* and *Fraxinus angustifolia* ssp. *pannonica* are dominant; the latter species may form consociation. In the shrub layer *Alnus glutinosa, Fraxinus angustifolia* ssp. *pannonica, F. pennsylvanica, Frangula alnus, Viburnum opulus, Salix cinerea* are frequent species. Characteristic species of the herb layer are *Carex riparia, C. acutiformis, Thelypteris palustris, Peucedanum palustre, Galium palustre, Stachys palustris, Glyceria maxima, Oenanthe aquatica.*

In the water among the trunks there are free-floating or rooted hydrophytes like *Lemna minor, Hottonia palustris* or swamp species like *Urtica kioviensis*. Unlike the literature data (Borhidi 2003) *Carex elata* is not present in either relevés but *Carex riparia* is dominant in certain relevés (at Márokpapi, Tiborszállás and Dámóc). In the majority of the relevés other swamp species can also be found (with low cover and high frequency) like *Symphytum officinale, Iris pseudacorus, Euphorbia palustre*. From among the protected species, *Dryopteris carthusiana* occurred in the relevé taken at Bockerek forest (Gelénes), *Hottonia palustris* and *Urtica kioviensis* occurred in the Tőserdő (Tiszaalpár) stand.

In the canopy layer of the *Fraxinus angustifolia* ssp. *pannonica* dominated relevés at Dámóc, *Fraxinus pennsylvanica* is subdominant reaching 7-10 % cover values. In the shrub layer *Fraxinus pennsylvanica* is dominant and *Prunus spinosa, Cornus sanguinea* and *Calystegia sepium* also occur. The herb layer is dominated by *Carex riparia, Fraxinus angustifolia* ssp. *pannonica, Glechoma hederacea* and

Fraxinus pennsylvanica and in some stands the patches of certain species like *Symphytum officinale, Stachys palustris, Rubus caesius* make it more diverse.

In the relevé made at Márokpapi, *Alnus glutinosa* was found neither in the canopy layer nor in the shrub layer. In both layers *Fraxinus angustifolia* ssp. *pannonica* was dominant which can form separate consociations (Borhidi 2003). In addition, *Salix alba* and *Fraxinus pennsylvanica* were present, too. The shrub layer consisted also of *Frangula alnus, Quercus robur, Salix cinerea* and *Rubus caesius*. In the herb layer *Carex acutiformis, Carex riparia, Galium palustre* and *Glyceria maxima* were dominant and swamp species like *Oenanthe aquatica, Stachys palustris, Euphorbia palustris, Iris pseudacorus, Lythrum salicaria, Lycopus europaeus* joined them.

In the relevés of Bockerek forest, *Alnus glutinosa* and *Fraxinus excelsior* are found in the canopy layer. In the relatively species poor herb layer *Impatiens noli-tangere* and *Moehringia trinervia* are dominant. *Dryopteris carthusiana* is a frequent characteristic species. *Convallaria majalis* and *Rubus caesius* occur in some relevés. In the relevés of Abádszalók, *Alnus glutinosa* is dominant and composes the canopy layer together with *Populus alba* and *Salix alba*. From among shrub species *Amorpha fruticosa* and *Salix cinerea* are present. The poor herb layer is dominated by *Equisetum arvense, Ranunculus repens* and *Solidago gigantea* with accompanying species like *Calystegia sepium, Lysimachia nummularia, Mentha arvensis* or *Leersia orizoides*.

The estimated cover values for the canopy layer are missing in the quadrates recorded on percent scale near Tőserdő but it can be seen in the description of stands that in the canopy layer only *Alnus glutinosa* is present and occasionally one of the *Fraxinus* species occurs (Bancsó 1987). The shrub layer is almost missing, sometimes young individuals of *Sambucus nigra* and *Fraxinus* species occur. The canopy layers of the three stands are similar. The young *Alnus* individuals are missing because the 4 m high individuals have dried out. The herb layer can be characterized with great variety, high total cover value and diversity. Considering each of the three stands, the dominant species are the following: *Alisma plantago-aquatica, Mentha aquatica, Urtica dioica, Ranunculus repens, Lycopus europeus, Carex pseudocyperus, Solanum dulcamara, Galium palustre, Leersia orisoides, Sium erectum, Sium latifolium, Symphytum officinale.* At the highest relief of the Tőserdő 1 stand a shallow basin has formed which contains water even at the beginning of June thus several species occur frequently that are characteristic for the Tőserdő stands like *Carex pseudocyperus, Mentha aquatica, Solanum dulcamara, Equisetum palustre, Stellaria media, Urtica dioica.*

Characteristic taxa of the lower reliefs are *Lysimachia nummularia, Galium aparine, Geranium robertianum* etc. Between the stands 1 and 2 a transitional zone can be found. It gets a permanent water supply from a spring. The largest patch of *Thelypteris palustris* (with 80% cover values) can be found in this area (Bancsó 1987). This area is adjacent to a typical swamp wood where terrestrial vegetation

develops only on the trunks of the alder trees thus the coverage of the soil surface is very low. Stand 2 can be divided into two parts: one part has a species-rich herb layer; the other one is a strongly degraded area, full of weed species. Apart from the dominant species the first part can be characterized by *Bidens tripartita* and *Hottonia palustris*, latter species is characteristic of the areas flooded for a long time. The separation of the second part is the consequence of its discontinuous surface water cover therefore the growth of the vegetation can start in early spring. The gradual desiccation of the soil results in a certain degradation, and as a consequence *Galium aparine, Rubus caesisus, Geum urbanum, Stellaria media, Alliaria petiolata* become dominant.

The stand 3 is covered by water for a rather long term of the vegetation period therefore the vegetation structure differs from that of the other stands. The representative species of the stand is *Urtica kioviensis*. Considering the number of species and the species composition, the stand has moderately degraded. *Mentha aquatica, Lycopus europeus* and *Symphytum officinale* are still dominant, but the relatively high ratio of *Rubus caesius, Glechoma hederacea* and *Rumex sanguineus* indicate degradation due to drying. Both the succession and the seasonal changes of the vegetation of higher relief are determined primarily by the water regime (Bancsó 1987).

Two historical relevés are presented from the 1960-ies recorded by Bodrogközy. In one of the relevés the canopy layer is dominated by *Alnus glutinosa*, while *Alnus glutinosa* and *Fraxinus pennsylvanica* occur in the other sample with low AD values (+). The shrub layer is missing in both places. The herb layer is dominated by *Thelypteris palustris; Solanum dulcamara* is subdominant in one of the relevés. Subordinate species are swamp elements like *Carex gracilis, Lycopus europaeus, Lythrum salicaria* and *Symphytum officinale*. In the herb layer of the other relevé *Urtica kioviensis* is dominant, *Galium aparine* and *Polygonum hydropiper* are subdominant. Subordinate species of this relevé differ from those of the other one: *Angelica sylvestris, Iris pseudacorus* and *Thalictrum flavum* occurred. The presence of *Urtica dioica* and *Galium aparine* refers to nitrogen accumulation.

The upper canopy layer of the Tiborszállás stand is composed of *Alnus glutinosa, Salix alba, Salix fragilis* and *Fraxinus angustifolia* ssp. *pannonica* and the last species is dominant, but the lower canopy is dominated by *Alnus glutinosa*. In the shrub layer *Alnus glutinosa* and *Fraxinus angustifolia* ssp. *pannonica* are accompanied by *Frangula alnus, Viburnum opulus* and *Rubus caesius*. All the upper layers have low total cover. In the herb layer *Carex* species (*C. acutiformis, C. riparia, C. vesicaria*) and *Glyceria maxima* are dominant and other common swamp species occur as well with low cover.

In the work of Bancsó (1987) the cover values are indicated as fractions (weighted with the number of individuals), these values were rounded off.

Analysis of the relevés of the alder-ash woods suggests that in the North border –Tokaj region of the Tisza Valley – unlike in the other sections – *Fraxinus excelsior* is present as subordinate species both in the shrub layer and in the herb layer. The species richness of the region between Szolnok and the southern border can be explained with the high number of the samples and with the different stands. The stand at Abádszalók (Lake Tisza region) is the most species-poor in respect of protected and characteristic species, this stand may be a planted forest. Summarising the results, it can be seen that the proportion of the subordinate species is very variable among the certain regions. Their presence is influenced by numerous biotic and abiotic factors such as the age and naturalness of the stand, the species composition and propagule supply of the neighbouring communities, and the stage of degradation.

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